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NOTES AND COMMENTS

NOTES ON THE DISTRIBUTION OF DERMAPTERA IN SOME COSTA RICAN CACAO PLANTATIONS

Annual cycles of wet and dry seasons in the tropical rain forest zone of eastern Costa Rica alter the distribution and abundance of leaf litter-inhabiting insects in cacao plantations (Young, A.M. 1982. J. Appl. Ecol. 19:47–63; 1983a. J. Appl. Ecol. 20:in press; 1983b. J. New York Ent. Soc. 91:in press; 1983c. Sociobiology 8:51–76). Few data, however, are available on the effects of tropical seasonality on litter-inhabiting Dermaptera. In this note I summarize some recent observations on earwigs associated with rotting sections (slices) of banana tree trunks in some Costa Rican cacao plantations.

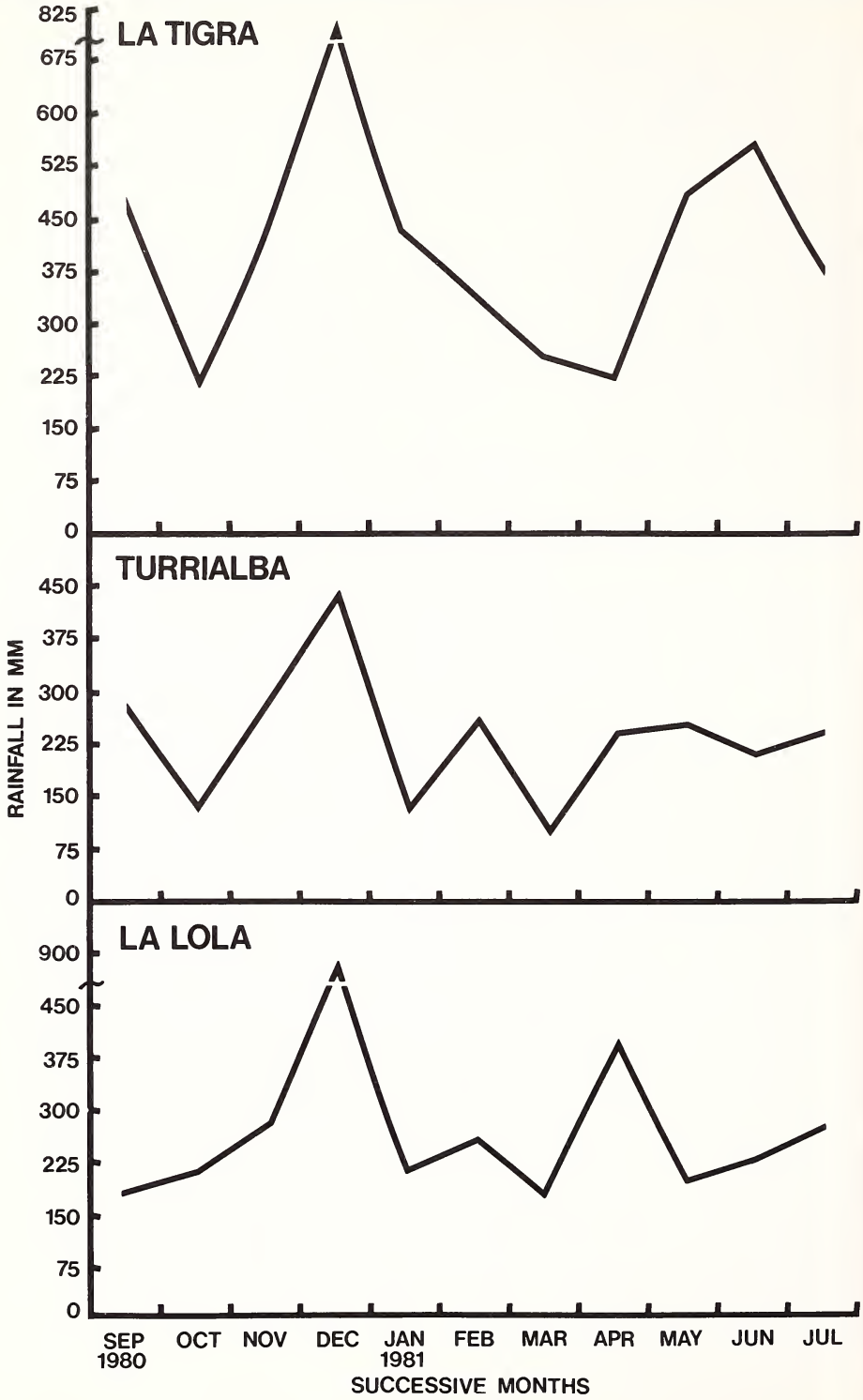
Earwigs in rotting sections of banana tree trunks distributed on the ground (each piece about 6–8 cm high × 15–18 cm dia.) were studied during 1981 and 1982 in these cacao plantations on the Atlantic or eastern watershed of Costa Rica: "La Tigra", near La Virgen (10°23′N, 84°07′W; 220 m elev.), Heredia Province; "Turrialba" or CATIE, in Turrialba (9°54′N, 83°41′W; 600 m elev.); "La Lola", near Siquirres (10°06′N, 83°30′W; 50 m elev.). Between 200 and 300 freshly-cut slices of banana tree trunks were placed in piles of 20–30 pieces each, in the leaf litter (details of these studies also given in Young, 1982, 1983a, op. cit.) three times each year. Earwigs were collected from the rotten slices along with occasional observations on these insects in leaf litter.

Two families, Carcinophoridae and Labiidae, were represented in the samples, the former by four genera and seven species, and the latter by one genus and species (*Marava triquetra* Hebard). Although a total of seven species were collected from La Lola, three from Turrialba, and two from La Tigra, no one genus or species occurred at all three localities (Table 1). *Carcinophora* was represented by three species, and all other genera by one or two species each. A total of 146 individuals (all species combined) were collected for all three plantations and dates, with three species having similar proportions in abundance, ranging from 22–27 percent. These species are: *Euborellia annulipes* Lucas (about 21.3 percent), *Anisolabis maritima* Bonelli (about 24.0 percent), and *M. triquetra* Hebard (about 27.3 percent). A fourth species, *Carcinophora gagatina* Klug, comprised another 12.3 percent of the sample, and all remaining species were far less numerous (Table 1). Interestingly, and in spite of the very small sample size and the equal sample sizes between seasons, more than five times the number of individuals (114) were collected in the dry season (Fig. 1) samples for all localities combined, and these were distributed among six species. By contrast, only 25 insects were collected in the wet season samples, representing five species. Of the very diverse dry season samples, about 35 percent were *M. triquetra,* 30 percent *A. maritima,* and 14 percent *C. gagatina,* for all three plantations combined. One species, *Isolabis howardi* Burr, was found only in the Turrialba dry season samples (Table 1). Collections of leaf litter during the wet season yielded 1–5 individuals of various species, for a total of five 1 × 1-m × 10 cm deep samples of cacao

Table 1. Distribution and abundance of earwigs (Dermaptera) in rotting cut slices of banana tree trunks at three Costa Rican cocoa plantation localities during rainy and dry seasons.

Species	Abundances of individuals in samples at each locality and at various dates					
	La Tigra		La Lola		Turrialba	
	Dates	Numbers	Dates	Numbers	Dates	Numbers
Carcinophora americana Beauvois	13-VII-76; ?-VIII-81; 30-VII-82 (all rainy season)	1-1-1	—	—	—	—
C. festiva Burr	—*	—	22-XI-81 (rainy)	3	—	—
C. gagatina Klug	—	—	10-II-81; 10-XI-81; 12-III-82 (rainy and dry resp.)	8-8-2	—	—
Anisolabsis maritima Bonelli	29-VII-82 (rainy)	1	10-II-81; 22-XI-81; 11-III-82 (rainy and dry resp.)	27-6-1	—	—
Euborellia annulipes Lucas	—	—	10-XI-80; 10-II-81; 22-XI-81; 12-III-82 (rainy and dry resp.)	2-12-12-1	17-II-81 (dry)	3
E. caribea Hebard	—	—	10-XI-80; 10-II-81 (rainy and dry resp.)	3-5	—	—
Isolabis howardi Burr	—	—	—	—	17-II-81 (dry)	8
Marava triquetra Hebard	—	—	10-II-81; 11-III-82 (rainy and dry resp.)	24-3	17-II-81 (dry)	13

* The mark "—" means that these species were not found in samples collected at the indicated locality.


LA TIGRA
825
675
600
525
450
375
300
225
150
75
0
TURRIALBA
450
375
300
225
150
75
0
RAINFALL IN MM
LA LOLA
900
450
375
300
225
150
75
0
SEP 1980
OCT
NOV
DEC
JAN 1981
FEB
MAR
APR
MAY
JUN
JUL
SUCCESSIVE MONTHS

leaves collected each time (N = 4 collections), while similar collections in the dry season produced only 0–1 earwigs.

These data strongly suggest that "diversity" of earwigs in rotting sections of banana tree trunks, that is, numbers of individuals (abundance) weighted by the number of species, greatly increases during the tropical dry season in these cacao plantations, even though the dry season is short and irregular (Fig. 1). The immature stages of Diptera such as Ceratopogonidae exhibit very high densities in rotting slices of banana tree trunks during the dry season in these cacao plantations (e.g., Young 1983a, op. cit.). Quite possibly, these microhabitats remain moist as the surrounding leaf litter dries out, thereby establishing mini-ecological refugia for insects such as earwigs.

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Fig. 1. Monthly patterns of rainfall at three localities in eastern Costa Rica. There is a tendency for drier conditions to prevail during the period January through April each year at these localities, although the "dry season" is very variable from year to year in this region of Costa Rica.